Claims

1. A optical Biopsy method for the diagnosis of precancerous lesion comprising
   - A light generated by a cold light source is used to irradiate the tested living tissue from which the tested white light image signals are reflected;
   - A focused near violet light generated by excited light is used to irradiate the tested living tissue from which the tested intrinsic fluorescence image signals are reflected;
   - A focused near violet light generated by excited light is used to irradiate the tested living tissue from which the tested weak fluorescence signals are reflected;
   - Said tested white light image signals and said tested intrinsic fluorescence image signals are combined to produce a image of the precancerous lesion site for grading the precancerous lesion;
   - An intrinsic fluorescence spectrum signals are generated from said tested weak fluorescence by which the precancerous lesion can be located and graded.

2. The optical Biopsy method of claims 1, comprising the step of detecting the wave shape of said intrinsic fluorescence spectrum signals at 470nm, 680nm and 400nm when identifying mild, moderate and severe atypical hyperplasia,
   - If the peak value at 470nm of the tested tissue is more than 70% of that of normal tissue, and there are no peaks at 680nm and 400nm, the lesion is thought to be benign;

- If the peak value at 470nm of the tested tissue is 50% less than that of normal tissue, and there are peaks at 680nm and 400nm, the lesion is thought to be severe atypical hyperplasia;
- If the peak value at 470nm of the tested tissue is 50% less than that of normal tissue, and there is only one peak at 680nm or at 400nm, the lesion is thought to be moderate atypical hyperplasia;
- If the peak value at 470nm of the tested tissue is 50% less than that of normal tissue, and there is no peak at either 680nm or 400nm, the lesion is thought to be mild atypical hyperplasia.

3. The optical Biopsy method of claims 1, wherein the color shown by the image of said precancerous lesion is as follows during identifying mild, moderate and severe atypical hyperplasia,
   - blue and white for the normal tissue;
   - orange or orange red for benign lesion;
   - violet red for severe atypical hyperplasia;
   - dark violet or dark red for moderate atypical hyperplasia;
   - dark colors for mild atypical hyperplasia.

4. The optical Biopsy method of claims 1, comprising the step of detecting the wave shape of said intrinsic fluorescence spectrum signals at 460nm-480nm, 390-410nm and 670nm-690nmits when identifying grade 1, grade 2 and grade 3 atypical hyperplasia,
   - If the peak value at 460nm-480nm is 50% less than that of normal tissue, and there are no peaks at 390nm-420nm and 670nm-690nm, the lesion is thought to be grade 1 atypical hyperplasia, the fluorescence color

shown by said precancerous lesion image is dark color, the lesion will susceptible not develop to cancer;

- If the peak value at 460nm-480nm is 50% less than that of normal tissue, and there is only one peak at 390nm-420nm or 670nm-690nm, the lesion is thought to be grade 2 atypical hyperplasia, the fluorescence color shown by said precancerous lesion image is dark violet or dark red, the lesion will possibly develop to cancer;
- If the peak value at 460nm-480nm is 50% less than that of normal tissue, and there are peaks at both 390nm-420nm and 670nm-690nm, the lesion is thought to be grade 3 atypical hyperplasia, the fluorescence color shown by said precancerous lesion image is dark violet red, the lesion will susceptible develop to cancer.

5. An apparatus of endoscope diagnosis of precancerous lesion using optical Biopsy method of claims 1, said apparatus comprises light source, optical channel system, endoscope and electronic system, wherein said light source includes an excited light and a cold light source, its characters are,
   - said optical channel system includes: in first channel, the cold light source entry a port of the light guide of the endoscope by passing through an optical fiber bundle, the object port of the endoscope aims to, but not physically touches the tested living tissue, the cold light source irradiates the tested living tissue, the white light image signal reflected from the tested living tissue is received by a weak fluorescence CCD that tightly connects to the port of the endoscope and then transmit to the interface circuit via a signal wire; in second channel, the near violet light generated by the excited light passes through a focusing glass and reach the port of the endoscope via optical fiber bundle, the object port of the

endoscope aims to, but not physically touches the tested living tissue, after the excited light irradiates the tested living tissue, the intrinsic fluorescence image signal reflected from the tested living tissue is received by a weak fluorescence CCD that tightly connects to the port of the endoscope and then transmit to the interface circuit via a signal wire; in third channel, the excited light as the second channel described above entry a port of the endoscope via optical fiber bundle, aims to and irradiates on the tested living tissue, the weak fluorescence signal reflected from the tested living tissue is transmitted to the OMA system via the weak fluorescence fiber bundle protruded from the forceps hole of the endoscope;

- said electronic system includes a weak light CCD which connects with the port of the endoscope tightly, the weak light CCD transmits the tested white light signals and the tested intrinsic fluorescence signals captured by it to the computer through an interface circuit, then the signals are sent to an image processor and an image display, the image is used to locate the precancerous lesion and to grade the precancerous lesion; the tested weak fluorescence signal transmitted from the weak fluorescence optical fibers goes through a rapid weak light spectrum analysis component – OMA system, from which intrinsic fluorescence spectrum signal is exported, the intrinsic fluorescence spectrum signal is then sent to the computer through a paralleled port, after that, it enters into a spectrum display by passing through a compressor, the spectrum is used to locate the precancerous lesion and to grade the precancerous lesion, therefore, precancerous lesion can be located rapidly and graded exactly and promptly in multiple ways; the power switches of excited light and the cold light source are connected with a light transmitter which is controlled

by a pedal switch, the pedal switch is also connected with the paralleled port and the image processor.

6. The apparatus of endoscope diagnosis for precancerous lesion of claims 5, its character is that the wavelength of said excited light is 330nm-420nm.

7. The apparatus of endoscope diagnosis for precancerous lesion of claims 5, its character is that said excited light optic fiber bundle and cold light source optic fiber bundle are included in a single bundle composed of multiple low wasting quartz optical fibers.

8. The apparatus of endoscope diagnosis for precancerous lesion of claims 5, its character is that said image signals of the tested living tissue from the image processor are sent to an image display.

9. The apparatus of endoscope diagnosis for precancerous lesion of claims 5, its character is that said image signals of the tested living tissue from the image processor are saved to disk or printed out by a printer after being compressed by a compressor.

10. The apparatus of endoscope diagnosis for precancerous lesion of claims 5, its character is that the spectrum signals of the tested living tissue sent to computer by the paralleled port and processed by the computer are saved to disk or printed out by a printer after being compressed by a compressor.